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27572	7590	07/17/2006	EXAMINER	
HARNESS, DICKEY & PIERCE, P.L.C.			PARSONS, THOMAS H	
P.O. BOX 828			ART UNIT	
BLOOMFIELD HILLS, MI 48303			PAPER NUMBER	
			1745	

DATE MAILED: 07/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/623,991	<b>Applicant(s)</b> FORMANSKI ET AL.	
	<b>Examiner</b> Thomas H. Parsons	<b>Art Unit</b> 1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 24 May 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1,3-6,8-12,14 and 16-22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 3-6, 8-12, 14, 16-22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

***Response to Amendment***

This is in response to the Amendment filed 24 May 2006

**(Previous) DETAILED ACTION**

***Claim Rejections - 35 USC § 112***

1. The rejection of claims 1, 3-6, 8-12, 14 and 16-22 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement has been **withdrawn** in view of Applicants' Amendment.

***Specification***

2. The disclosure **stands** objected to because of the following informalities:  
Paragraph [0028], line 2, suggest changing "due" to "--dew"--.  
Appropriate correction is required.

***Amendment***

3. The objection to the amendment filed 20 March 2006 under 35 U.S.C. 132(a) because it introduces new matter into the disclosure has been **withdrawn** in view of Applicants' Amendment.

***Claim Rejections - 35 USC § 112***

4. The rejections of claims 1, 3-6, 8-12, 14 and 16-22 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject

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matter which applicant regards as the invention have been withdrawn in view of Applicants' Amendment.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 3-6, 8-12, 14 and 16-22 **stand** rejected under 35 U.S.C. 103(a) as being unpatentable over Benz et al. (5,645,950) in view of Reiser et al. (4,202,933).

**Claim 1:** Benz et al. in Figure 1 disclose a fluid flow system to adjust a humidity of a gas supplied in a fuel cell system, comprising:

a fuel cell stack (12) having a cathode inlet and a cathode exhaust (col. 2: 8-12);

a compressor (6) that draws in fresh gas (3) and compresses the gas therein; and

an injector (10) **injecting water into the gas within the compressor**, the compressor supplying the gas to the cathode inlet; and

a controller that controls the compressor and the injector to adjust the humidity (col. 3: 60-col. 4: 12). See col. 2: 8 - col. 3: 15, and col. 3: 48 - col. 4: 12.

Benz et al. do not disclose a compressor that draws in a mixture of fresh gas and humidified exhaust gas from the cathode exhaust and compresses the mixture therein, a metering device to adjust the flow of cathode exhaust to the compressor, and a controller that controls the metering device.

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Reiser et al. in Figure 1 disclose a cathode exhaust recycle loop (48) extending from the cathode exhaust line (32) to the cathode inlet line (26), a metering device (54, 27) to adjust a flow of cathode exhaust gas **to the compressor**, and a controller (50) that controls the metering device (54, 27)(col. 2: 44 - col. 3: 9). Reiser et al. in col. 5: 15-29 further disclose, "...Also, in this embodiment, the recycle blower is either on or off while the air flow is reduced on a continuum. There is no reason why the recycle blower cannot be a variable speed blower such that the control 50 can vary the amount of recycle on a continuum. Along these same lines, *there is no reason why the control 50 cannot be programmed to simultaneously or individually vary the cathode exhaust recycle flow rate and the air flow rate in accordance with a predetermined schedule*. Theoretically the ultimate goal is to select the best combination of recycle flow rate and air flow rate at each operating point so as to achieve the best possible compromise between power plant efficiency and power plant life under what would generally be considered to be adverse operating conditions."

Accordingly, because both Benz et al. and Reiser et al. are concerned with controlling air flow via a controller, the Benz et al. combination would obviously provide the claimed controller that controls the metering device, the injector and the compressor to adjust the humidity. Alternatively, because the Benz et al. combination is structurally similar to what is instantly disclosed, the fluid flow system of the Benz et al. combination would obviously provide claimed controller that controls the metering device, the injector and the compressor to adjust the humidity

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the system of Benz et al. by incorporating the cathode

exhaust recycle loop and the features of the controller for controlling the same as taught by Reiser et al. because Reiser et al. teach a cathode exhaust recycle loop that would have lessened or eliminated the incidence of oxygen starvation of individual cells in a stack at lower power levels thereby improving the overall performance of the entire stack.

Further, because the Benz et al. combination would obviously provide a mixture of fresh gas and cathode exhaust prior to the fuel cell, the Benz et al. combination would obviously provide the claimed compressor that draws in a mixture of fresh gas and humidified exhaust gas from the cathode exhaust and compresses the mixture therein and provide water injection into the mixture.

Further, in light of the teachings in Benz et al. and Reiser et al. to a controller for controlling the entire fuel cell system, it would have been within the skill of one having ordinary skill in the art at the time the invention was made to have modified the controller of the Benz et al. combination to provide for controlling cathode exhaust independent of the fresh gas.

**Claims 3-6:** The limitations set forth therein have been considered, and construed as process limitations that add no additional structure to the Benz et al. combination. Further, because the Benz et al. combination is structurally the same as instantly claimed, and provides a controller in communication with the compressor, the injector, and metering device, it appears capable of providing the claimed process limitations.

**Claim 8:** The rejection of claim 8 is as set forth above in claim 1 wherein the Benz et al. combination would obviously provide a method of regulating a humidity of a cathode supply gas to a cathode side of a fuel cell stack, comprising:

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mixing the cathode supply gas with a feedback gas from the cathode side to effect a relative humidity of the cathode supply gas;

injecting water into the cathode supply gas to further effect the relative humidity of the cathode supply gas; and

compressing the cathode supply gas in a compressor.

Further, in light of the teachings in Benz et al. and Reiser et al. to a controller for controlling the entire fuel cell system, it would have been within the skill of one having ordinary skill in the art at the time the invention was made to have modified the controller of the Benz et al. combination to provide for adjusting a flow of the feedback gas based on a desired relative humidity of the cathode supply gas.

**Claim 9:** The rejection is as set forth above in claim 8 wherein further the Benz et al. combination discloses that the cathode supply gas is air. See Benz et al., Figure 1, air supply line 3, and Reiser et al., col. 3: 60-61).

**Claim 10:** The rejection is as set forth above in claim 8 wherein further Benz et al. disclose vaporizing the water within the compressor (col. 3: 4-6).

**Claim 11:** The rejection is as set forth above in claim 8 wherein further Benz et al. disclose that vaporizing is achieved using heat generated through compression (col. 3: 4-6).

**Claim 12:** The rejection is as set forth above in claim 8 wherein further Benz et al. disclose adjusting a compression pressure of the compressor based on a quantity of water to vaporize the water therein (col. 3: 63- col. 4: 5).

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**Claim 14:** The rejection of claim 14 is as set forth above in claim 1 wherein the Benz et al. combination would obviously provide a method of regulating a relative humidity of a gas supplied to a cathode side of a fuel cell stack, comprising:

controlling a flow of feedback gas from the cathode side to a compressor to adjust the relative humidity of the gas (see claim 13 above);

vaporizing water in the compressor to further adjust the relative humidity of the gas (Benz et al. disclose vaporizing the water within the compressor (col. 3: 4-6).;

and discharging the gas at a pressure sufficient for use in the fuel cell stack.

Benz et al. disclose that the water may be injected upstream of the compressor which has been construed as providing water injection into the compressor.

**Claim 16:** The rejection is as set forth above in claim 8 wherein further Benz et al. disclose that vaporizing is achieved using heat generated through compression (col. 3: 4-6).

**Claim 17:** The rejection is as set forth above in claim 8 wherein further Benz et al. disclose adjusting a compression pressure of the compressor based on a quantity of water to vaporize the water therein (col. 3: 63- col. 4: 5).

**Claims 18 and 19:** The rejection is as set forth above in claim 8 wherein the Benz et al. combination discloses a feedback gas but is silent as to a saturated or super-saturated feedback (i.e. recycled cathode exhaust gas). However, because the method of the Benz et al. combination is the same as that instantly claimed, it would obviously provide a saturated or super-saturated feedback.

**Claim 20:** The rejection is as set forth above in claim 1 wherein the Benz et al. combination would obviously provide a method of regulating a relative humidity of a gas, comprising:

controlling a flow of feedback gas to a compressor to adjust said relative humidity of said gas (see claim 13 above); and

vaporizing water injected into the compressor to further adjust the relative humidity of the gas Benz et al. disclose vaporizing the water within the compressor (col. 3: 4-6).

**Claims 21 and 22:** The rejection of claims 21 and 22 are as set forth above in claims 18 and 19.

### ***Response to Arguments***

7. Applicant's arguments filed 24 May 2006 have been fully considered but they are not persuasive.

The Applicants argue, "...the combination of Benz and Reiser appears to use impermissible hindsight...The combination of Benz and Reiser does not appear to be motivated by anything other than hindsight reconstruction of the claims of the present invention." (See page 9 of the Remarks filed 24 May 2006).

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the

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applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Applicants argue, ...”Accordingly, the teaching of Reiser is only relevant to a method of reducing the power output of the fuel cell and does not relate to membrane humidification. As such, there does not appear to be any proper motivation to combine the power reduction system of Reiser with the humidification system shown in Benz.”

In response, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988 ) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

In this case, Reiser et al. have been relied upon for its teaching that it is known to recycle a controlled flow of cathode exhaust and to control the flow of cathode exhaust and air, individually, or simultaneously, to the cathode inlet of a fuel cell. The motivation to combine

comes not only from this teaching but also because Reiser et al. teach that cathode exhaust recycle would improve fuel cell stack performance by selecting the best combination of recycle flow rate and air flow rate at each operating point so as to achieve the best possible compromise between power plant efficiency and power plant life under what would generally be considered to be adverse operating conditions. Further, Benz et al. are concerned with oxygen demand (content) (Benz et al., col. 4: 32-49) wherein both Benz et al. and Scheffler et al. determine air flow by sensors 34 and 33, respectively.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the system of Benz et al. by incorporating the cathode exhaust recycle loop of Scheffler et al. because Scheffler et al. teach a cathode exhaust recycle loop that would have improved the oxygen demand or content thereby lessening or eliminating the incidence of oxygen starvation of individual cells in a stack at lower power levels thereby improving the overall performance of the entire stack.

The Applicants argue, "Further, the Examiner cites Benz as disclosing injecting water into the gas within the compressor. However, this is not disclosed in Benz. Benz states "water may be injected either downstream or upstream of compressor 6." (col. 3, lines 3-4). Since there is no motivation in Benz for injecting water into the gas within the compressor, it cannot be seen as teaching or suggesting this feature.

In response, *In re Japikse*, 181 F.2d 1019, 86 USPQ 70 (CCPA 1950) (Claims to a hydraulic power press which read on the prior art except with regard to the position of the

starting switch were held unpatentable because shifting the position of the starting switch would not have modified the operation of the device.); In re Kuhle, 526 F.2d 553, 188 USPQ 7 (CCPA 1975) (the particular placement of a contact in a conductivity measuring device was held to be an obvious matter of design choice). However, "The mere fact that a worker in the art could rearrange the parts of the reference device to meet the terms of the claims on appeal is not by itself sufficient to support a finding of obviousness. The prior art must provide a motivation or reason for the worker in the art, without the benefit of appellant's specification, to make the necessary changes in the reference device." Ex parte Chicago Rawhide Mfg. Co., 223 USPQ 351, 353 (Bd. Pat. App. & Inter. 1984).

Benz et al. by stating "water may be injected either downstream or upstream of compressor 6." (col. 3, lines 3-4) provides motivation for rearranging the injector. Accordingly, it would have been an obvious matter of design choice to one with ordinary skill in the art at the time the invention was made to shift the injector from an upstream location to the compressor, since the Applicants have not disclosed that this particular location provides any criticality and/or unexpected results, and it appears that injecting the water into the mixture prior to compression would perform equally well with water injected into the mixture within the compressor.

### ***Conclusion***

1. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas H. Parsons whose telephone number is (571) 272-1290. The examiner can normally be reached on M-F (7:00-4:30) First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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PATRICK JOSEPH RYAN  
SUPERVISORY PATENT EXAMINER

Thomas H Parsons  
Examiner  
Art Unit 1745

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